

# PATENT ABSTRACTS OF JAPAN

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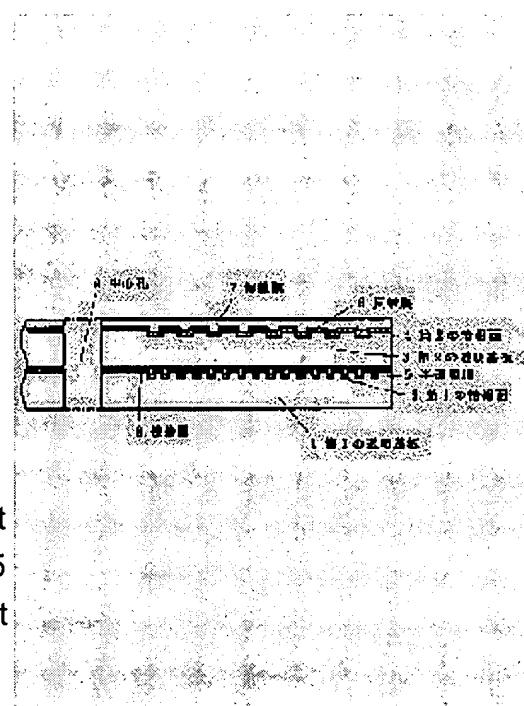
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## (54) OPTICAL INFORMATION RECORDING MEDIUM

### (57)Abstract:

**PURPOSE:** To obtain an optical information recording medium, reproduction of which is possible with a reproducing device for both of SDs and HDMCDs or a reproducing device for both of SDs and CDs, by providing this recording medium with a translucent film and reflection film corresponding to first and second transparent substrate, respectively.

**CONSTITUTION:** The first transparent substrate 1 has a first information surface 2 having a smooth surface and pits corresponding to first recording information. This first information surface 2 is coated with the translucent film 5 to pass a part of a reproducing beam and to reflect a part thereof. The second transparent substrate 3 has a second information surface 4. This second information surface 4 is coated with the reflection film 6 for reflecting a greater part of the reproducing beam. The optical information recording medium is formed by sticking or superposing the first transparent substrate 1 and the second transparent substrate 3. Thereby, the distance between the first information surface 2 and the second information surface 4 and the thickness of the second transparent substrate 3 are increased, out-of-focus-servo is prevented, and the reproduction of the information at a high SN is made possible.



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CLAIMS

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[Claim(s)]

[Claim 1] The 1st transparency substrate covered with the semi-transparent membrane which a smooth field and the 1st information side which has a pit corresponding to the 1st recording information are provided, and said 1st information side penetrates a part of playback beam, and reflects a part, Provide a smooth field and the 2nd information side which has a pit corresponding to the 2nd recording information, and said 2nd information side has the 2nd transparency substrate covered by the reflective film which reflects most playback beams. The optical information record medium characterized by making said smooth field of said 2nd transparency substrate paste together or accumulate on the 1st [ of said 1st transparency substrate / said ] information side.

[Claim 2] The optical information record medium characterized by being an optical information record medium according to claim 1, and the thickness of said 1st transparency substrate and said 2nd transparency substrate being 0.6mm of abbreviation.

[Claim 3] The optical information record medium characterized by information being recorded by record format which are claim 1 and an optical information record medium according to claim 2, and is different from said 1st information side and said 2nd information side.

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**DETAILED DESCRIPTION**

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the optical information record medium which reproduces information by light.

[0002]

[Description of the Prior Art] The optical disk which forms the minute hollow called the pit corresponding to recording information to the field of one side of a transparency substrate, doubles the focus of a laser beam with a pit through a transparency substrate, and reproduces recording information by change of the amount of reflected lights of a laser beam is an example with a typical compact disk (CD:Compact Disk).

[0003] As for CD, the pit train of about 0.9 micrometers of the shortest pit length is formed in a transparency substrate with a diameter [ of 120mm ], and a thickness of 1.2mm by the 1.6-micrometer track pitch, the linear velocity at the time of playback is fixed s about 1.3m /, it has the storage capacity of about 650 M bytes, and digital data, such as music and an image, are recorded. With the format based on CD specification below, it shall consider as the thing of the above-mentioned specification, and CD-ROM (Compact Disk-Read Only Memory), Video-CD (Video-Compact Disk), etc. shall be included.

[0004] On the other hand, researches and developments of the digital video disc (DVD:Digital Video Disk) which raised recording density by about 6 to 8 times the CD are progressing. Two methods are proposed by current and DVD, and one is a method called SD (Super Density Disk), other one is a method called HDMCD (High Density Multimedia Compact Disk), and it is incompatible among both.

[0005] The mimetic diagram of the cross-section structure of SD was shown in drawing 3, and the mimetic diagram of the cross-section structure of HDMCD was shown in drawing 4. As shown in drawing 3, SD has composition which stuck the 1st transparency substrate 12 with a diameter [ of 120mm ], and a thickness of 0.6mm in which the 1st information side 13 was formed, and the 2nd transparency substrate 14 with a diameter [ of 120mm ], and a thickness of 0.6mm in which the 2nd information side 15 was formed, with ultraviolet-rays hardening resin 16 so that each information side might serve as the inside.

[0006] Here, the front face of the 1st information side 13 and the 2nd information side 15 is covered by the reflective film 17 which consists of metals, such as aluminum which reflects most laser beams, and playback of recording information is performed from both sides through the 1st transparency substrate 12 and the 2nd transparency substrate 14.

[0007] Moreover, only the front face of the 1st information side 13 is replaced with the reflective film 17, a part of laser beam is penetrated, it considers as a wrap configuration with the semi-transparent membrane which consists of the dielectric which reflects the remainder, and SD of the type which can both reproduce the information recorded on the 1st information side 13 and the 2nd information side 15 through the 1st transparency substrate 12 is also proposed.

[0008] The specification of SD by which the current proposal is made is 650nm or 635nm, and track pitch 0.725micrometer, the 0.4 micrometers of the shortest pit length, the linear-velocity about 4 m/s

regularity at the time of playback, and memory capacity make about 10 G bytes of both sides, and playback laser beam wavelength the thing of the above-mentioned specification with the format based on SD specification below.

[0009] On the other hand, as shown in drawing 4, HDMCD has composition with a two-layer information side on the transparency substrate 18 with a diameter [ of 120mm ], and a thickness of 1.2mm. The 1st information side 19 is formed with injection molding, and the front face penetrates a part of laser beam, and is covered with the semi-transparent membrane 20 which consists of the dielectric which reflects the remainder. The 2nd information side 21 is formed by irradiating ultraviolet rays and hardening the ultraviolet-rays hardening resin 24 applied by the thickness of about 40 micrometers on the semi-transparent membrane 20, pushing by La Stampa, the front face is covered by the reflective film 22 which consists of metals, such as aluminum which reflects most laser beams, and the front face of the reflective film 22 is further covered by the protective coat 23 which consists of ultraviolet-rays hardening resin etc.

[0010] The specification of HDMCD by which the current proposal is made is 635nm, and track pitch 0.84micrometer, the 0.451 micrometers of the shortest pit length, the linear-velocity about 4 m/s regularity at the time of playback, and memory capacity make about 7.4 G bytes and playback laser beam wavelength the thing of the above-mentioned specification with the format based on HDMCD specification below.

[0011]

[Problem(s) to be Solved by the Invention] As mentioned above, record formats not only differ as SD, HDMCD, and CD, but the thickness of a transparency substrate differs from 1.2 doublemm with HDMCD and CD to being 0.6mm by SD. If it is going to play the disk with which the thickness of a transparency substrate differs using the same objective lens, aberration occurs on an information side and the diameter of a spot of a playback laser beam cannot be narrowed down to extent which can read pit information.

[0012] Therefore, the optical information record medium with which information was recorded in the format based on SD specification was unreplicable with the regenerative apparatus for HDMCD, or the regenerative apparatus for CD. Moreover, the optical information record medium with which information was recorded in the format based on the reverse HDMCD or CD specification was unreplicable with the regenerative apparatus for SD.

[0013] It succeeds in this invention in order to solve the above technical problem, and it offers a refreshable optical information record medium in both regenerative apparatus for SD, and regenerative apparatus for CD in both regenerative apparatus for SD, and regenerative apparatus for HDMCD.

[0014]

[Means for Solving the Problem] According to invention according to claim 1, this invention is an optical information record medium. The 1st transparency substrate covered with the semi-transparent membrane which a smooth field and the 1st information side which has a pit corresponding to the 1st recording information are provided, and said 1st information side penetrates a part of playback beam, and reflects a part, Provide a smooth field and the 2nd information side which has a pit corresponding to the 2nd recording information, and said 2nd information side has the 2nd transparency substrate covered by the reflective film which reflects most playback beams. It is characterized by making said smooth field of said 2nd transparency substrate paste together or accumulate on the 1st [ of said 1st transparency substrate / said ] information side.

[0015] According to invention according to claim 2, it is an optical information record medium according to claim 1, and is characterized by the thickness of the 1st transparency substrate and the 2nd transparency substrate being 0.6mm of abbreviation.

[0016] According to invention according to claim 3, it is claim 1 and an optical information record medium according to claim 2, and is characterized by said 1st information side and above being recorded by different record format from the 2nd information side.

[0017]

[Function] Since one optical information record media [ two ] can have the information side of different

specification according to the optical information record medium according to claim 1, a refreshable optical information record medium can be obtained also in any of the regenerative apparatus of two different specification. Moreover, the 1st information side penetrates a part of playback laser beam, and it is covered with the semi-transparent membrane which reflects a part, and since the 2nd information side is covered by the reflective film which reflects most playback laser beams, it can reproduce the information recorded on the information and the 2nd information side which were recorded on the 1st information side from one side of an optical information record medium.

[0018] According to the optical information record medium according to claim 2, the information recorded on the 1st information side can be reproduced from the objective lens of the pickup which projects a playback laser beam with the regenerative apparatus for optical information record media using the transparency substrate of 0.6mm of abbreviation, and the information recorded on the 2nd information side can be reproduced with the regenerative apparatus for optical information record media using the transparency substrate of 1.2mm of abbreviation.

[0019] According to invention according to claim 3, two information sides which have the information recorded in a different record format in one optical information record medium can be established.

[0020]

[Example] Hereafter, the optical information record medium of this invention is explained to a detail using a drawing. Drawing 1 is the mimetic diagram showing the cross-section structure of the optical information record medium of this invention. The 1st transparency substrate 1 with which it has the feed hole 9 with a diameter of 15mm by 0.6mm in the diameter of 120mm, and thickness, and the 1st information side 2 was formed like drawing 1, Similarly it has the feed hole 9 with a diameter of 15mm by 0.6mm in the diameter of 120mm, and thickness, and has the structure where it was stuck to the 1st information side 2 of the 1st transparency substrate 1 on the 2nd smooth side of the 2nd transparency substrate 3, through the glue line 8 in the 2nd transparency substrate 3 with which the 2nd information side 4 was formed.

[0021] Here, the front face of the 1st information side 2 is covered with the semi-transparent membrane 5 which penetrates a part of playback laser beam, and reflects a part. Moreover, the front face of the 2nd information side 4 is covered by the reflective film 6 which reflects most playback beams, and the front face of the reflective film 6 is further covered by the protective coat 7.

[0022] A semi-transparent membrane 5 consists of metals, such as dielectric films, such as ZnS, Si2N3, or AlN, and aluminum, Au or Ag. Moreover, a reflecting layer 6 consists of metals, such as aluminum, Au, or Ag.

[0023] Since the thickness of the 1st transparency substrate 1 of the information record medium of this invention is about 0.6mm, the information recorded on the 1st information side 2 can be read with the regenerative apparatus for optical disks which used the transparency substrate with a thickness of 0.6mm. That is, if information is recorded on the 1st information side 2 based on SD specification, it can consider as a refreshable optical information record medium with the regenerative apparatus for SD.

[0024] Moreover, the thickness of the 2nd transparency substrate 3 of the information record medium of this invention is about 0.6mm like the 1st transparency substrate 1, and since the thickness of a disk is set to about 1.2mm when both are stuck, the recording information of the 2nd information side 4 can be read with the regenerative apparatus for optical disks which used the transparency substrate with a thickness of 1.2mm. That is, if information is recorded on the 2nd information side 4 based on CD specification and HDMCD specification, it can consider as a refreshable optical information record medium with the regenerative apparatus for CD, or the regenerative apparatus for HDMCD.

[0025] Therefore, the information record medium of this invention can be used as a refreshable optical information record medium in both a refreshable optical information record medium or regenerative apparatus for SD, and regenerative apparatus for HDMCD in both regenerative apparatus for SD, and regenerative apparatus for CD.

[0026] Next, concrete application of the optical information record medium of this invention is explained. For example, if information is recorded in the format based on SD specification in programs, such as a certain movie, in the 1st information side 2 (data compression method MPEG 2:Moving

Picture Coding Experts Group 2) and information is recorded on the 2nd information side 4 in the format based on Video-CD specification (data compression method MPEG 2), in the regenerative apparatus of both regenerative apparatus for Video-CD, or regenerative apparatus for SD, it is reproducible with one optical information record medium.

[0027] Moreover, if programs, such as a movie, are recorded on the 1st information side 2 in the format based on SD specification and the music which is sound tracks, such as the movie, is recorded on the 2nd information side 4 in the format based on CD specification, programs, such as a movie, can be enjoyed with the regenerative apparatus for SD with one optical information record medium, and the music which is the sound track of the movie can be enjoyed with the regenerative apparatus for CD.

[0028] Moreover, if programs, such as a movie, are recorded on the 1st information side 2 in the format based on SD specification and it records on the 2nd information side 4 in the format based on HDMCD specification, in the regenerative apparatus of both regenerative apparatus for SD, and regenerative apparatus for HDMCD, it is reproducible with one optical information record medium.

[0029] Next, the manufacture approach of the optical information record medium of this invention is explained. Drawing 2 is the mimetic diagram showing the manufacture approach of the optical information record medium of this invention. First, using the 1st La Stampa on which information is recorded in the format based on SD specification like drawing 2 (a), it consists of resin, such as a polycarbonate, and the 1st transparence substrate 1 which has a feed hole with a diameter of 15mm by 0.6mm in the diameter of 120mm and thickness is produced with injection molding.

[0030] Then, like drawing 2 (b), the semi-transparent membrane 5 which consists of a dielectric or a metal is formed in the front face of the 1st information side 2 of the 1st transparence substrate 1 with the sputtering method or vacuum deposition so that it may become about 30% of reflection factor to a playback laser beam with a wavelength of 650-680nm.

[0031] Next, using the 2nd La Stampa on which information is recorded in the format based on CD specification or HDMCD specification like drawing 2 (C), it consists of resin, such as a polycarbonate, and the 2nd transparence substrate 3 which has a feed hole with a diameter of 15mm by 0.6mm in the diameter of 120mm and thickness is produced with injection molding.

[0032] Then, the reflective film 6 which consists of a metal like drawing 2 (d) so that 70% or more of reflection factor may be obtained to the wavelength of 650-680nm or a 780nm playback laser beam on the front face of the 2nd information side 2 of the 2nd transparence substrate 3 is formed with the sputtering method or vacuum deposition.

[0033] And like drawing 2 (e), on the field in which the semi-transparent membrane 5 of the 1st transparence substrate 1 was formed, the glue lines 8, such as ultraviolet-rays hardening resin, are thinly applied to about several 10 micrometers, and the smooth side of the 2nd transparence substrate 3 is stuck. Furthermore, as shown in drawing 2 (f), the protective layers 7, such as ultraviolet-rays hardening resin, are formed in the front face of the reflective film 6. You may print on a protective layer 7 if needed. Moreover, you may carry out to the lamination of the 1st transparence substrate 1 and the 2nd transparence substrate 3 by the hot melt method etc., and both transparence substrate may be fixed for the periphery section and/or the inner circumference section of the 1st transparence substrate 1 and the 2nd transparence substrate 3 with a fixture like a check pin, without forming a glue line 8.

[0034] Here, another effectiveness of the optical information record medium of this invention is explained. Refreshable SD and refreshable HDMCD of a type from conventional one side Since the distance between the 1st information side and the 2nd information side is about 40 micrometers only as shown in drawing 4, For example, when disturbance, such as vibration, was added while reproducing the 1st information side 19, the focus servo of a playback laser beam separated according to the disturbance, the focus of a playback laser beam suited the 2nd information side 21, and the phenomenon in which playback of the 1st information side will be interrupted had happened. It was also acting that a focus servo tends to separate from it since especially the 1st information side 19 has only about 30% of reflection factor by the semi-transparent membrane 20.

[0035] However, since the distance between the 1st information side 2 of the optical information record medium of this invention and the 2nd information side 4 is as large as about 0.6mm which is the

thickness of the 2nd transparency substrate 3 as shown in drawing 1, For example, even if disturbance, such as vibration, is added while reproducing the 1st information side 2, the phenomenon of the focus of a playback laser beam moving to the 2nd information side 4, and carrying out the reverse migration hardly happens.

[0036] As further effectiveness of the optical information record medium of this invention, moreover, since the distance between the 1st information side 2 and the 2nd information side 4 is as large as about 0.6 micrometers as mentioned above, Since the area which requires the playback laser beam for reproducing the 2nd information side 4 for the 1st information side is large compared with conventional SD and conventional HDMCD, Since the amount of signals of the information recorded on the 1st information side superimposed in the regenerative signal of the information recorded on the 2nd information side 2 is very small, the optical information record medium which can reproduce information with a high SN ratio (Signal to Noise Ratio) can be obtained.

[0037]

[Effect of the Invention] As mentioned above, the optical information record medium of this invention can be reproduced in both regenerative apparatus for SD, and regenerative apparatus for CD in both regenerative apparatus for SD, and regenerative apparatus for HDMCD.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The mimetic diagram showing the cross-section structure of the optical information record medium of this invention

[Drawing 2] The mimetic diagram showing the manufacture approach of the optical information record medium of this invention

[Drawing 3] The mimetic diagram of the cross-section structure of the conventional SD

[Drawing 4] The mimetic diagram of the cross-section structure of the conventional HDMCD

[Description of Notations]

- 1 1st Transparency Substrate
- 2 1st Information Side
- 3 2nd Transparency Substrate
- 4 2nd Information Side
- 5 Semi-transparent Membrane
- 6 Reflective Film
- 7 Protective Coat
- 8 Glue Line
- 9 Feed Hole
- 10 1st La Stampa
- 11 2nd La Stampa
- 12 1st Transparency Substrate
- 13 1st Information Side
- 14 2nd Transparency Substrate
- 15 2nd Information Side
- 16 Ultraviolet-Rays Hardening Resin
- 17 Reflective Film
- 18 Transparency Substrate
- 19 1st Information Side
- 20 Semi-transparent Membrane
- 21 2nd Information Side
- 22 Reflective Film
- 23 Protective Coat
- 24 Ultraviolet-Rays Hardening Resin

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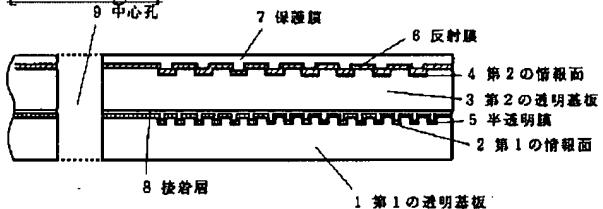
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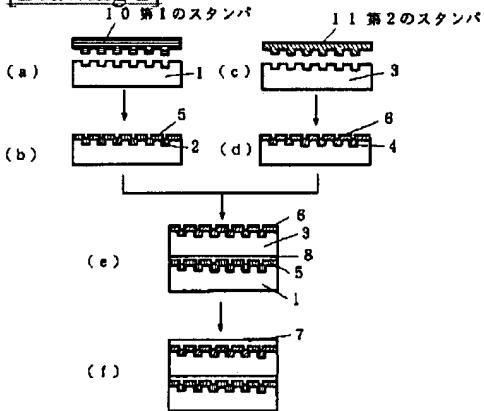
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## DRAWINGS

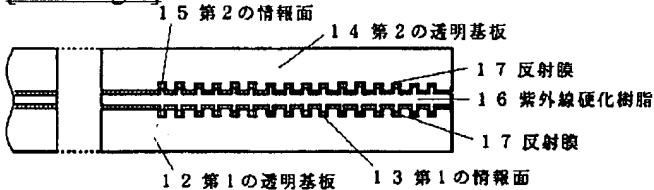
[Drawing 1]



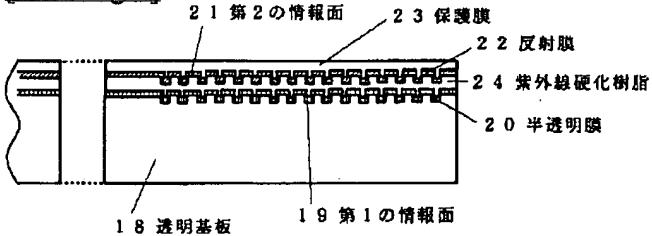
[Drawing 2]



[Drawing 3]



[Drawing 4]



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CORRECTION OR AMENDMENT

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[Procedure revision]  
[Filing Date] October 19, Heisei 10  
[Procedure amendment 1]  
[Document to be Amended] Specification  
[Item(s) to be Amended] Claim  
[Method of Amendment] Modification  
[Proposed Amendment]  
[Claim(s)]  
[Claim 1] A smooth field and the 1st [ with the 1st information side which has a pit train corresponding to the 1st recording information ] transparency substrate,  
It has a smooth field and the 2nd [ with the 2nd information side which has a pit train corresponding to the 2nd recording information ] transparency substrate,  
Said 1st information side of said 1st transparency substrate and said smooth field of said 2nd transparency substrate face each other, and said 1st transparency substrate and said 2nd transparency substrate are pasted together, or a laminating is carried out,  
The optical information record medium characterized by the recording density of said 1st recording information recorded on said 1st information side being higher than the recording density of said 2nd recording information recorded on said 2nd information side.  
[Claim 2] The optical information record medium characterized by being an optical information record medium according to claim 1, and the thickness of said 1st transparency substrate and said 2nd transparency substrate being 0.6mm of abbreviation.  
[Claim 3] The optical information record medium characterized by information being recorded by record format which is an optical information record medium according to claim 1 or 2, and is different

from said 1st information side and said 2nd information side.

[Claim 4] It is the optical information record medium by which it is an optical information record medium according to claim 1 to 3, said 1st information side is covered with by the 1st reflective film which reflects the 1st playback beam of the 1st wavelength, and penetrates the 2nd playback beam of the 2nd wavelength, and it is covering [ said 2nd information side ]-by 2nd reflective film which reflects said 2nd playback beam characterized.

[Claim 5] It is the optical information record medium which is an optical information record medium according to claim 4, and is characterized by said 1st wavelength being wavelength shorter than said 2nd wavelength.

[Procedure amendment 2]

[Document to be Amended] Specification

[Item(s) to be Amended] 0014

[Method of Amendment] Modification

[Proposed Amendment]

[0014]

[Means for Solving the Problem] The 1st transparency substrate with which invention of this application according to claim 1 possesses the 1st information side which has a pit train corresponding to a smooth field and the 1st smooth recording information in an optical information record medium, It has a smooth field and the 2nd transparency substrate possessing the 2nd information side which has a pit train corresponding to the 2nd recording information. Said 1st information side of the 1st transparency substrate and said smooth field of said 2nd transparency substrate face each other, and the laminating of said 1st transparency substrate and said 2nd transparency substrate is pasted together or carried out. It is characterized by the recording density of said 1st recording information recorded on said 1st information side being higher than the recording density of said 2nd recording information recorded on said 2nd information side.

[Procedure amendment 3]

[Document to be Amended] Specification

[Item(s) to be Amended] 0016

[Method of Amendment] Modification

[Proposed Amendment]

[0016] According to invention according to claim 3, it is an optical information record medium according to claim 1 or 2, and is characterized by information being recorded by different record format from said 1st information side and said 2nd information side. According to invention according to claim 4, it is an optical information record medium according to claim 1 to 3. Said 1st information side It is characterized by being covered by the 1st reflective film which reflects the 1st playback beam of the 1st wavelength, and penetrates the 2nd playback beam of the 2nd wavelength, and covering said 2nd information side by the 2nd reflective film which reflects said 2nd playback beam. According to invention according to claim 5, it is an optical information record medium according to claim 4, and said 1st wavelength is characterized by being wavelength shorter than said 2nd wavelength.

[Procedure amendment 4]

[Document to be Amended] Specification

[Item(s) to be Amended] 0017

[Method of Amendment] Modification

[Proposed Amendment]

[0017]

[Function] Since one optical information record medium has the information side equipped with two different recording density according to the optical information record medium according to claim 1, a refreshable optical information record medium can be obtained also in any of the regenerative apparatus based on the specification corresponding to each recording density.

[Procedure amendment 5]

[Document to be Amended] Specification

[Item(s) to be Amended] 0018

[Method of Amendment] Modification

[Proposed Amendment]

[0018] The 1st recording information which was recorded on the 1st information side according to the optical information record medium according to claim 2 The distance from the plane of incidence of a playback beam to an information side can be reproduced with the regenerative apparatus for optical information record media whose thickness of 0.6mm of abbreviation and the whole medium is 1.2mm of abbreviation, and can reproduce the 2nd recording information recorded on the 2nd information side with the regenerative apparatus for optical information record media whose thickness of 1.2mm of abbreviation and the whole medium the distance from the plane of incidence of a playback beam to an information side is 1.2mm of abbreviation.

[Procedure amendment 6]

[Document to be Amended] Specification

[Item(s) to be Amended] 0019

[Method of Amendment] Modification

[Proposed Amendment]

[0019] According to the optical information record medium according to claim 3, two information sides which have the information recorded in a different record format in one optical information record medium can be established. The 1st playback beam which was equipped with the 1st wavelength for the 1st recording information recorded on the 1st information side according to claim 4 and the optical information record medium according to claim 5 It can reproduce, the 2nd recording information recorded on the 2nd information side can be reproduced by the 2nd playback beam equipped with the 2nd wavelength, and the 2nd recording information further recorded on the 1st recording information and the 2nd information side which were recorded on the 1st information side from one side of an optical information record medium can be reproduced.

[Procedure amendment 7]

[Document to be Amended] Specification

[Item(s) to be Amended] 0020

[Method of Amendment] Modification

[Proposed Amendment]

[0020]

[Example] Hereafter, the optical information record medium of this invention is explained to a detail using a drawing. Drawing 1 is the mimetic diagram showing the cross-section structure of the optical information record medium of this invention. Like drawing 1, the optical information record medium of this example is with the 1st transparency substrate 1 with which it has the feed hole 9 with a diameter of 15mm by 0.6mm in the diameter of 120mm, and thickness, and the 1st information side 2 was formed in one side, Similarly it has the feed hole 9 with a diameter of 15mm by 0.6mm in the diameter of 120mm, and thickness, and has structure which stuck the 2nd transparency substrate 3 with which the 2nd information side 4 was formed in one side through the glue line 8 so that the 1st information side 2 of the 1st transparency substrate 1, the 2nd information side 4 of the 2nd transparency substrate 3, and the smooth side of the opposite side might face each other.

[Procedure amendment 8]

[Document to be Amended] Specification

[Item(s) to be Amended] 0026

[Method of Amendment] Modification

[Proposed Amendment]

[0026] Next, concrete application of the optical information record medium of this invention is explained. For example, if information is recorded in the format based on SD specification in programs, such as a certain movie, in the 1st information side 2 and information is recorded on the 2nd information side 4 in the format based on Video-CD specification, an optical information record medium reproducible in the regenerative apparatus of both regenerative apparatus for Video-CD or regenerative

apparatus for SD will be obtained.

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[Translation done.]